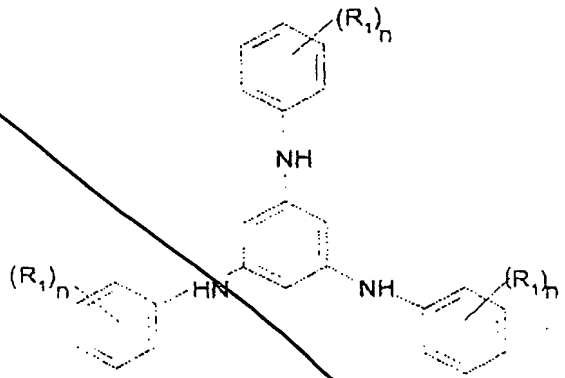
CLAIMS

Sub A1

1. Composition intended to prevent the radical polymerization of ethylenically unsaturated monomers, characterized in that it comprises at least one bezenetriamine derivative corresponding to general formula (I):



(I)

in said formula (I):

-the identical or different R_1 radicals, represent a hydrogen atom or an electro-doner group,

-the n's, identical or different, represent a number equal to 0, 1 to 5.

2. Composition according to claim 1, ~~characterized in that~~ wherein the benzenetriamine derivative corresponds to formula (I) in which n is a number less than or equal to 4, ~~preferably equal to 1 or 2.~~

3. Composition according to claim 1, ~~characterized in that~~ wherein the benzenetriamine derivative corresponds to formula (I) in which R_1 represents:

.a linear or branched alkyl radical, having 1 to 6 carbon atoms, ~~preferably 1 to 4 carbon atoms such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, sec-butyl, tert-butyl,~~

.a linear or branched alkenyl radical, having 2 to 6 carbon atoms, ~~preferably 2 to 4 carbon atoms such as vinyl, allyl,~~

.a linear or branched alkoxy or thioether radical, having 1 to 6 carbon atoms, ~~preferably 1 to 4 carbon atoms such as methoxy, ethoxy, propoxy, isopropoxy, butoxy radicals, an alkenyloxy radical, preferably an allyloxy radical or a phenoxy radical,~~

.a radical of formula:

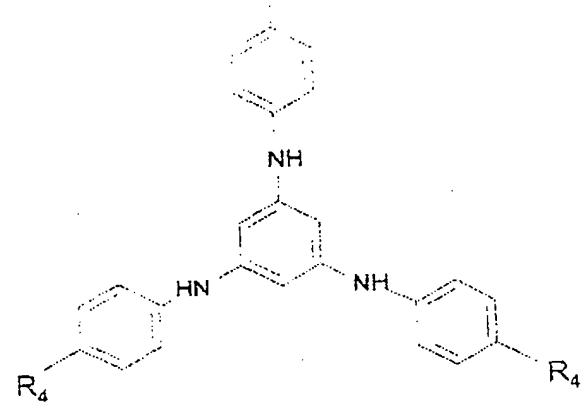
$-R_2-OH$

$-R_2-SH$

$-R_2-N-(R_3)_2$

in which formulae R_2 represents a valency bond or a linear or branched, saturated or unsaturated divalent hydrocarbon radical having 1 to 6 carbon atoms ~~such as, for example, methylene, ethylene, propylene, isopropylene~~, the identical or different R_3 radicals, represent a hydrogen atom or a linear or branched alkyl radical having 1 to 6 carbon atoms.

4. Composition according to claim 1, ~~characterized in that~~ wherein R_4 the benzenetriamine derivative corresponds to formula (Ia):



(Ia)

in said formula (Ia):

-the identical or different R_4 radicals, represent a hydroxyl group or a linear or branched alkyl or alkoxy radical having 1 to 4 carbon atoms.

5. Composition according to claim 1, ~~characterized in that~~ wherein the benzenetriamine derivative is N,N',N''-tri(p-methoxyphenyl)-1,3,5-benzenetriamine and N,N',N''-tri(p-methylphenyl)-1,3,5-benzenetriamine.

6. Composition according to ~~one of claims 1 to 5,~~ claim 1 ~~characterized in that it~~ comprising ~~comprises~~ one or more solvents selected from benzene, toluene, xylene, ethyl benzene, styrene, acetophenone and methylphenylcarbinol as a vehicle.

7. Composition according to ~~one of claims 1 to 6, characterized in that, (in the case of an ethylenically unsaturated aromatic monomer)~~ claim 1 ~~it comprises~~ comprising at least one nitroaromatic derivative.

8. Composition according to claim 7, ~~characterized in that~~ wherein the nitroaromatic derivative is selected from 2,6-dinitro-4-methylphenol, 2,4-dinitro-6-methylphenol, 2,4-dinitrophenol, 2,4-dinitro-6-sec-butylphenol and 2,4-nitro-4-methylphenol, the nitroaromatic derivative being preferably ~~2,4-dinitro-6-sec-butylphenol.~~

9. Composition according to ~~one of claims 7 and 8, characterized in that~~ claim 7 wherein the ratio of the total mass of benzenetriamine derivative of formula (I) constituents to the total mass of nitroaromatic derivative type constituents is comprised between 90/10 and 10/90, ~~preferably between 80/20 and 20/80~~.

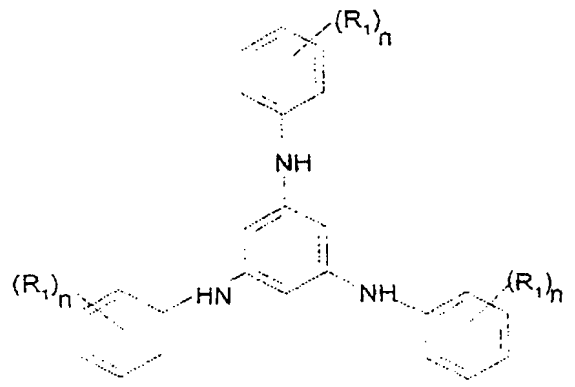
10. Composition according to ~~one of claims 1 to 9, characterized in that it further comprises~~ claim 1 further comprising another polymerization inhibitor.

11. Composition according to claim 10, ~~characterized in that~~ wherein the polymerization inhibitor is selected from the alkylated phenols ~~such as tert-butyl-catechol, 2,5-di-tert-octylhydroquinone~~, 3,5-di-tert-octylcatechol; compounds of nitroxide type ~~such as 2,2,6,6-tetramethylpiperidine-N-oxyl, 4-hydroxy-2,2,6,6-tetramethylpiperidine-N-oxyl, 4-oxo-2,2,6,6-tetramethylpiperidine-N-oxyl; 4-amino-2,2,6,6-tetramethylpiperidine-N-oxyl; imidazolidines/imidazolines-N-oxyl, preferably 2,2,3,4,5,5-hexamethylimidazolidine-1~~-oxyl or any other known inhibitor.

12. Composition according to claim 10, ~~characterized in that~~ wherein the polymerization inhibitor is hydroquinone; p-methoxyphenol; ~~phenothiazines~~ and, in the case of an ethylenically unsaturated aliphatic monomer.

13. Composition according to ~~one of claims 10 to 12, characterized in that~~ claim 10 wherein the quantity of polymerization inhibitor is such that the ratio of the total mass of the benzenetriamine derivative type of formula (I) constituents to the total mass of the other inhibitors is comprised between 90/10 and 10/90, ~~preferably 80/20 and 20/80.~~

14. Process intended to prevent the radical polymerization of an ethylenically unsaturated monomer ~~including the addition~~ comprising adding to said monomer ~~of~~ an effective quantity of at least one benzenetriamine derivative corresponding to general formula (I):



(I)

in said formula (I):

- the identical or different R_1 radicals, represent a hydrogen atom or an ~~electro-doner~~ group,

-the n's, identical or different, represent a number equal to 0, 1 to 5.

15. Process according to claim 14, ~~characterized in that~~ the benzenetriamine derivative corresponds to formula (I) in which n is a number less than or equal to 4, ~~preferably equal to 1 or 2.~~

16. Process according to ~~one of claims 14 and 15~~, ~~characterized in that~~ the benzenetriamine derivative corresponds to formula (I) in which R_1 represents:

.a linear or branched alkyl radical, having 1 to 6 carbon atoms, ~~preferably 1 to 4 carbon atoms such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, sec-butyl, tert-butyl,~~

.a linear or branched alkenyl radical, having 2 to 6 carbon atoms, ~~preferably 2 to 4 carbon atoms such as vinyl, allyl,~~

.a linear or branched alkoxy or thioether radical, having 1 to 6 carbon atoms, ~~preferably 1 to 4 carbon atoms such as methoxy, ethoxy, propoxy, isopropoxy, butoxy radicals, an alkenyloxy radical, preferably an allyloxy radical or a phenoxy radical,~~

.a radical of formula:

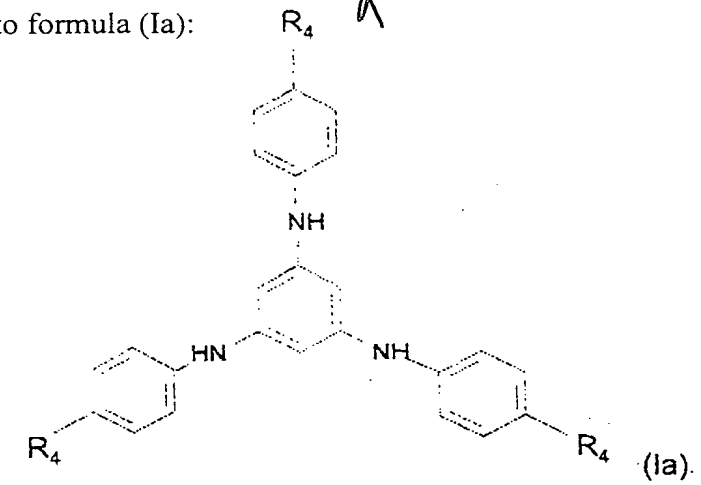
$-R_2-OH$

$-R_2-SH$

$-R_2-N-(R_3)_2$

in said formulae R_2 represents a valency bond or a linear or branched, saturated or unsaturated divalent hydrocarbon radical having 1 to 6 carbon atoms ~~such as, for example, methylene, ethylene, propylene, isopropylene;~~ the identical or different R_3 radicals represent a hydrogen atom or a linear or branched alkyl radical having 1 to 6 carbon atoms.

17. Process according to claim 14, ~~characterized in that~~ wherein the benzenetriamine derivative corresponds to formula (Ia):



(Ia)

in said formula (Ia):

-the identical or different R_4 radicals, represent a hydroxyl group or a linear or branched alkyl or alkoxy radical having 1 to 4 carbon atoms.

18. Process according to ~~one of claims 14 to 17, characterized in that~~ claim 14 wherein the total quantity of the benzenetriamine derivative of formula (I) added is ~~comprised~~ between 1 and 2000 ppm, ~~preferably between 5 and 1000 ppm~~ relative to the total weight of said monomer.

19. Process according to ~~one of claims 14 to 18, characterized in that~~ claim 14 wherein the quantity of nitroaromatic type derivative is such that the ratio of the mass of benzenetriamine type derivatives of formula (I) to the total mass of nitroaromatic-type constituents is ~~comprised~~ between 90/10 and 10/90, ~~preferably 80/20 and 20/80~~.

20. Process according to ~~one of claims 14 to 19, characterized in that~~ claim 14 wherein the quantity of polymerization inhibitor is such that the ratio of the mass of benzenetriamine-type derivatives of formula (I) to the total mass of the other inhibitors is ~~comprised~~ between 90/10 and 10/90, preferably between 80/20 and 20/80.

21. Process according to ~~one of claims 14 to 20~~, ~~characterized in that~~ said ethylenically unsaturated monomer is a vinylaromatic monomer, preferably selected from styrene, α-methylstyrene, vinyltoluene, divinylbenzene and styrenesulphonic acids.

22. Process according to ~~one of claims 14 to 20~~, ~~characterized in that~~ said ethylenically unsaturated aliphatic monomer is selected from olefinic monomers comprising one or two unsaturations; unsaturated halogenated monomers; unsaturated acids; unsaturated esters; unsaturated resins; unsaturated amides; unsaturated nitriles; unsaturated ethers.

23. Process according to claim 22, ~~characterized in that~~ said ethylenically unsaturated aliphatic monomer is selected from isoprene and butadiene; vinyl chloride, chloroprene, vinylidene chloride, vinylidene fluoride and vinyl fluoride acrylic acid, methacrylic acid and crotonic acid; unsaturated acrylic acid esters of methyl acrylate, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, 2-hydroxyethyl acrylate, hydroxypropyl acrylate type; unsaturated methacrylic acid esters of methyl methacrylate, butyl methacrylate, lauryl methacrylate, dimethylaminomethyl methacrylate, stearyl methacrylate type; vinyl acetate; acrylated epoxy resins and polyethyleneglycol diacrylate; acrylamide, N,N-dimethylacrylamide, methylenebisacrylamide and N-vinylpyrrolidone; acrylonitrile; vinyl and methyl ether; vinylpyridines; diethyl vinylphosphonate and sodium styrene sulphonate.

24. Process according to claim 23, ~~characterized in that~~ said aliphatic monomers are esters of acrylic acid and methacrylic acid.